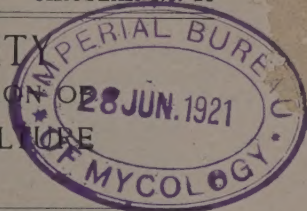


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PEACH CANKERS AND THEIR TREATMENT¹

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Cankers are prevalent on all varieties of peach trees and are found on wood of all ages, from the trunk of the tree and the larger limbs to the growth of the current year. They are always more or less injurious to the tree, either killing the branches on which they occur or weakening them so that the set of fruit is decreased. The extent of the injury depends on the number and size of the cankers. Cankers are prevalent on peaches throughout the State, but are particularly abundant in the older peach-growing sections (Plate I). Two very distinct types of cankers occur—brown rot cankers, and cankers caused by injuries of winter, the latter commonly designated as frost cankers; other types are often found, but not in such abundance.

BROWN ROT CANKERS

As indicated by the name, the brown rot canker is caused by the same fungus (*Sclerotinia fructigena*) that produces the brown rotting of the fruit. Blossoms are also attacked and blighted (Plate II, B), but peach-growers are not generally cognizant of the amount of injury that comes from such infection. Whether it is the blossom or the fruit that is attacked, there is always the probability that the fungus will pass into the fruit spur, and thence frequently into the twig or the limb (Plate II). Affected twigs usually are girdled, and the leaves beyond the point of entrance wilt and turn brown. The fungus often passes down affected twigs into the larger limbs.

When a limb is reached, the fungus spreads in all directions. Soon a sinking of the tissue is noticeable and this is followed by the formation of a gum pocket. Later the diseased bark cracks and splits and the gum oozes out in a sticky mass (Plate II, C). The fungus grows up and down the branch more rapidly than around it, and the diseased area is thus longer than broad. The blighted twig or spur remains in the center of the dead area and often persists there for several years. Even when it is broken off, the fact that it was there can be determined easily by cutting in with a knife.

The fungus grows noticeably faster during periods when the tree is in an actively growing condition. Just as the tree responds to increased moisture from rainfall, so the fungus responds to increased moisture in the sappier tissue of the tree.

During the intervening periods of dry weather, when the fungus is less active, the tissues of the tree begin a healing process at the margin of the diseased area, throwing up a roll of tissue known as a callus. Sometimes the fungus remains quiescent or dies and the wound is healed over. Usually, however, the callus eventually is invaded. This process may be

¹ A report of work performed on the industrial fellowship established by the Newfane Fruit Growers' Association, through whose financial cooperation the work has been made possible.

repeated from year to year, the canker increasing in size each time. The approximate age of the canker can be determined from the number of rolls. Ordinarily one roll represents a year, although two rolls may form in one year.

The annual formation of a callus about the diseased area makes the limb broader at that place, and the failure to form wood over the cankered area flattens it (Plate III). The old bark gradually breaks away, and black molds growing over the masses of dried gum make the canker black and rough. Larvæ of the peach-borer are often found in the gum and add to the roughness.

FROST CANKERS

Frost cankers are oftenest found on the main trunk of the tree, usually near the surface of the ground or at the snow line of the previous winter (Plate IV); in the crotches of the larger branches (Plate V); or about pruned stubs (Plate VI). They appear after a hard winter, particularly one of extreme changes in temperature and more particularly when such a winter follows a very late growing season. The cankers appear in the spring as slight depressions. These are made more apparent as the tree puts on new growth of wood over the area not affected. Gum pockets usually form under the flattened areas and the gum often oozes out during periods of wet weather. The injured area is usually rather indefinite about the margin, and the formation of a healthy roll of callus is thereby much retarded. Fermentation of the dead tissue occurs and various fungi and insects quickly follow. One fungus, *Valsa leucostoma*, comes in so commonly that sometimes it has been regarded as the cause of the trouble.²

OTHER CANKERS

Both the cankers described above are characterized by an exudation of gum. Almost any injury to a peach tree made during an actively growing period will initiate a gummy degeneration, or gum canker. Thus injuries made by careless use of tools, by hail, or by careless pruning, may develop into gummy cankerous areas. Such injuries are likely to heal over, but when the affected area is invaded by various fungi or insects a gum canker usually results.

CONTROL

It is obviously much better to prevent the formation of cankers in the trees than to treat them after they appear. Also, their recurrence in treated trees should be prevented if possible.

Prevention of brown rot cankers

Control of blossom blight

The control of blossom blight is an important factor in the prevention of canker formation. It may be accomplished by destroying the sources of spring infection. In New York orchards this means disposal of mummies, both those on the ground and those clinging to the trees; those on the ground, however, seem to be the more important sources. These may be destroyed by early spring plowing. Obviously the plowing must be done shortly before the blossoming period. In many orchards this is usually possible, but in many others it is not.

The same result may be accomplished by destroying the rots and the soft

² *Valsa leucostoma* isolated from frost cankers on peach trees has been used repeatedly for inoculating healthy trees, but only with negative results.

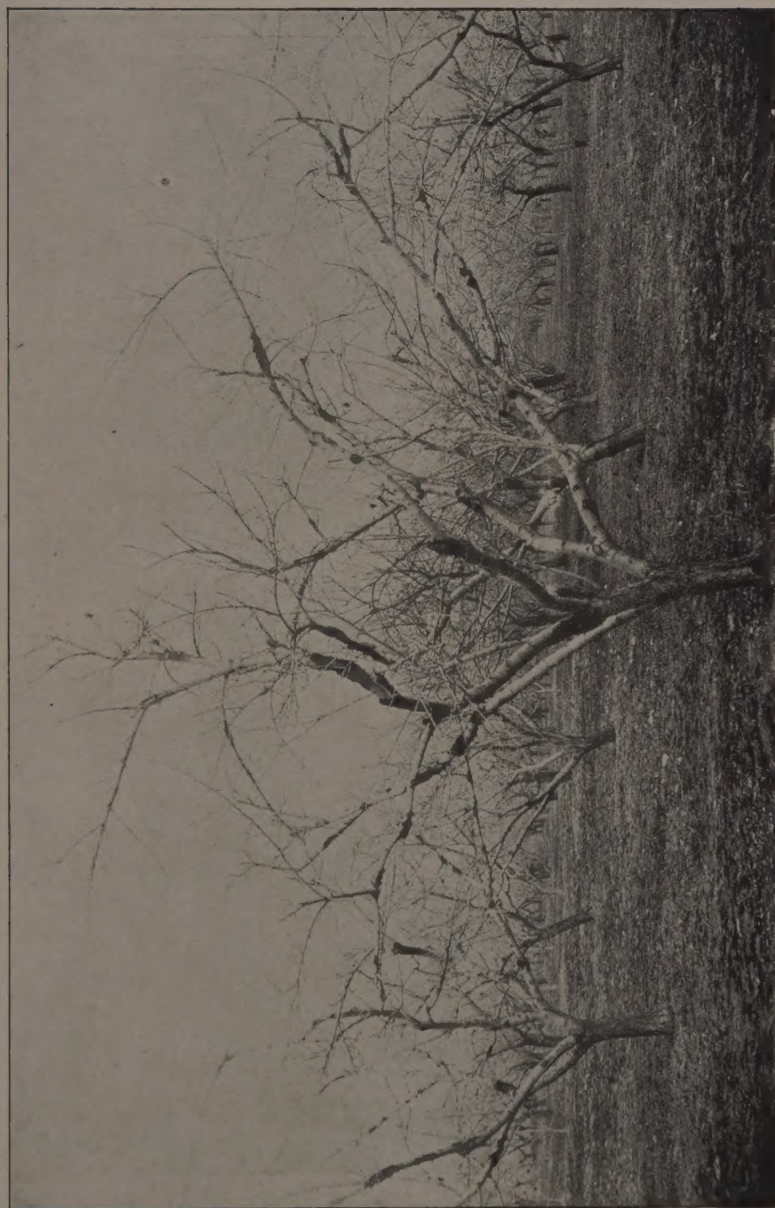


PLATE I.—PEACH ORCHARD SEVERELY INFECTED WITH BROWN ROT CANKER
Photograph made April 27, 1911

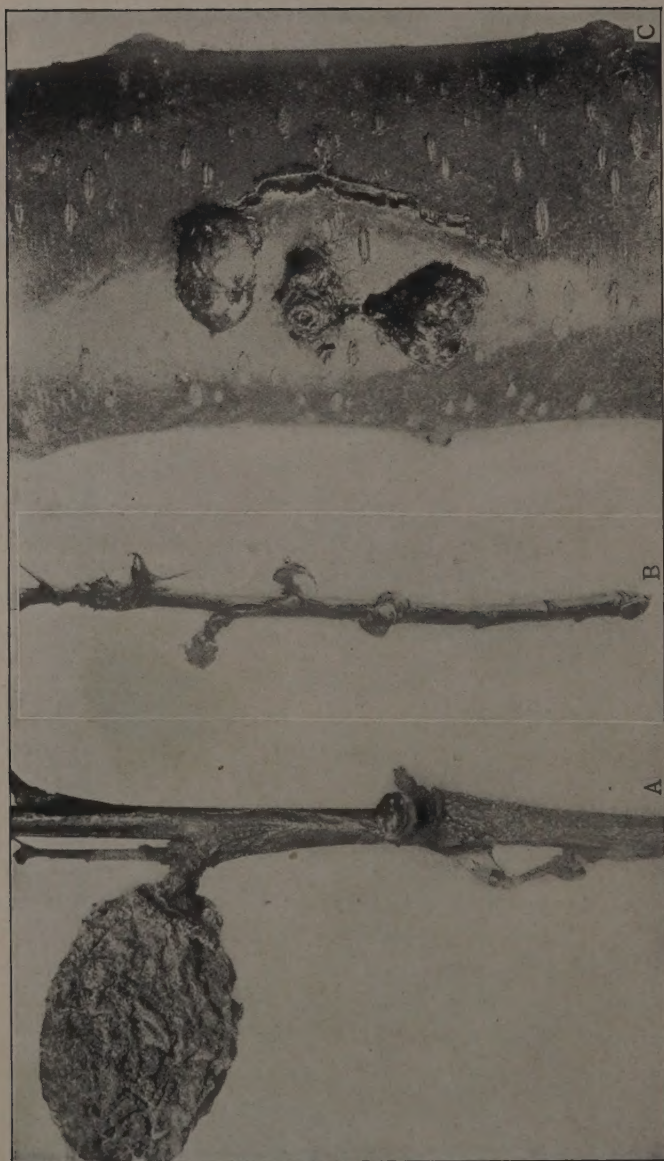


PLATE II.—YOUNG CANKERS AND THEIR ORIGIN

A, Girdling and blighting of twig by way of a rotted fruit. Gum is oozing at the base of the canker. Natural size. Photograph made October 15, 1913
 B, Blossom blight. The blossoms are held in place by a mass of gum, and cankers are beginning to appear
 C, Young canker in a large limb. The spur through which the fungus entered is broken off. Gum flow is copious. Natural size. Photograph made June 28, 1914



PLATE III.—BROWN ROT CANKERS

A, The twig through which the fungus entered the limb shows clearly at the center. The rolls of wood, the dried remains of gum, and the rough and blackened appearance, are characteristic

B, A canker viewed from the rear. The limb is practically girdled

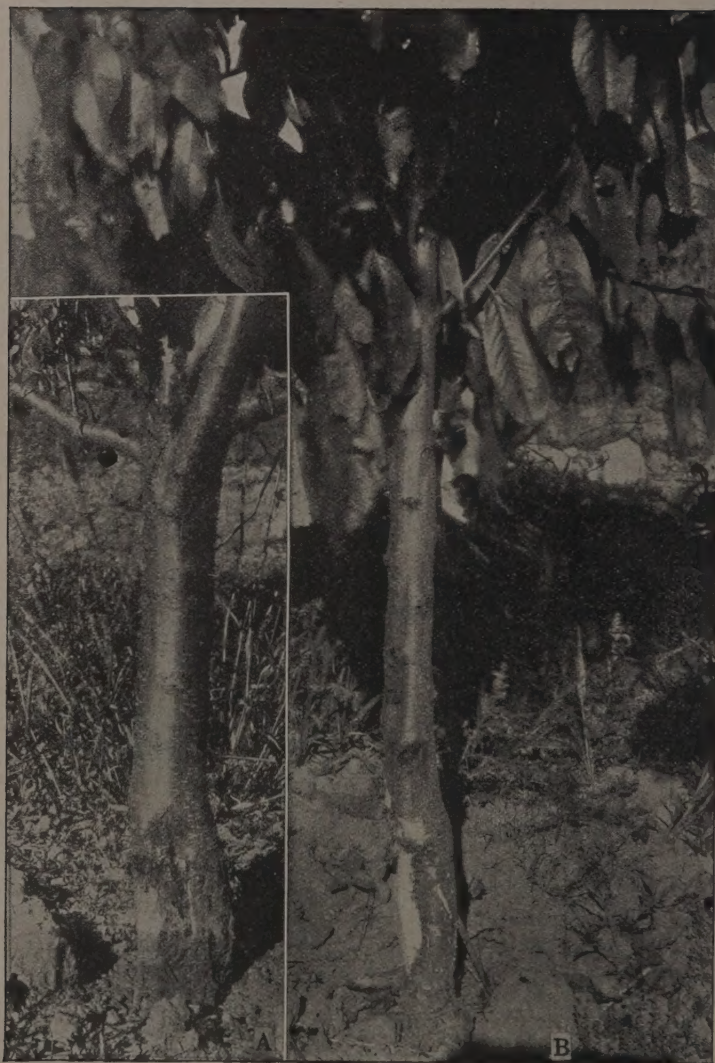


PLATE IV.—FROST CANKERS

A, Frost canker at snow line. Photograph made September 20, 1911, by F. M. Blodgett.

B, Frost canker on younger tree than is shown in A. The dead tissue was removed on June 20, 1911, leaving less than two inches of healthy bark. Note particularly the large roll of healthy tissue. Photograph made September 20, 1911, by F. M. Blodgett.



PLATE V.—FROST CANKERS

A, Trunk and crotch cankers removed on June 20, 1911. Photograph made September 20, 1911, by F. M. Blodgett. Note the large roll of healthy callus

B, Frost cankers in this tree were also treated on June 20, 1911, but the photograph was made on August 25, 1913, by J. L. Weimer. Note that the wounds have nearly healed



PLATE VI.—FROST CANKER ABOUT PRUNED STUB

*Such stubs should be avoided by making the cut parallel to the main limb.
Photograph made June 28, 1914*



PLATE VII.—TREATMENT OF BROWN ROT CANKERS

Photographs made in July, 1911. All somewhat reduced, and no two to exactly the same scale

A, Canker before treatment. Note exuding gum

B, Diseased tissue removed and wound ready for preservative

C, Exposed area treated with gas tar



PLATE VIII.—TREATED CANKERS

A, A small canker treated in August, 1911. Somewhat enlarged. Photograph made June 28, 1914

B, A large canker treated in August, 1911. Somewhat reduced. Photograph made June 28, 1914. Note the large roll of healthy callus

peaches at harvest time. All such fruits should be dropped to the ground, where they may be raked up and drawn off or where hogs, if given an opportunity, will soon make an end of them.

Some method of spraying the expanding or recently opened blossoms might prove effective, but experimentation along this line is too meager to more than suggest the trial of commercial lime-sulfur solution diluted at the rate of one part to forty or fifty parts of water.

Control of fruit rot

Likewise the control of fruit rot is involved in canker prevention. This may be accomplished by the use of Scott's lime-sulfur mixture.³

In New York orchards the application of this spray mixture a month before picking time seems to be most important, although one or two earlier applications are sometimes advisable.

Even when spraying is practiced, a certain amount of brown rot may occur. This is likely to come on late, on overripe fruits left hanging to the trees, and especially on such fruits as have been left because of injury by wasps or other insects. Disposition of such fruit has been discussed under the preceding heading.

Protection of large limbs

When blossoms or fruits occur on short spurs issuing directly from the large limbs, the possibility of destructive canker formation resulting is greatly increased.

In case of infection the fungus must grow only an inch or two through the spur in order to reach the limb and begin the formation of a canker in a limb in which is involved a third, a fourth, or a fifth of the bearing area of the tree, as the case may be. Such spurs should be rubbed off at pruning time.

Fertilization

It has been observed that brown rot canker is more abundant in well-cultivated orchards that have been highly, not to say excessively, fertilized with nitrogenous fertilizers. Some growers, however, are aware of this fact and still insist on the use of fertilizer (stable manure) as the best means of securing satisfactory crops of fruit. This would seem to be a matter that each individual must work out for himself.

Prevention of frost cankers

It is impossible to predict the character of the winters, but one can judge by the growth and maturation of the wood what the probabilities are that a tree is in good condition to withstand a severe winter. Soft, poorly matured wood is easily injured. The use of highly nitrogenous fertilizers, particularly their use too late in the season, is to be avoided. In seasons of drought followed by abundant autumn rains a second growth is not uncommon. This may be prevented or held to a suitable minimum by the use of cover crops.

³ This is not a boiled solution, as might be inferred from the name. It is prepared by placing in a barrel eight pounds of best stone lime, to which is added a small quantity of cold water in order to start it slaking. Eight pounds of sulfur worked through a sieve to break up the lumps is then added to the slaking lime, which is kept from burning by the addition of just enough cold water so as not to drown it. The slaking mixture must be stirred constantly. Just as soon as the slaking is completed (which should be in five to fifteen minutes), fill the barrel with cold water (fifty gallons). The mixture is strained into the sprayer tank through a sieve of twenty meshes to the inch. It must be agitated constantly while being applied, as it settles rapidly. When properly made this is merely a fine mechanical mixture of lime and sulfur produced by the heat and bubbling action of slaking, and should have but little sulfur in solution. This mixture is especially adapted for the spraying of peaches and plums in foliage, as it causes no injury. Arsenate of lead may be added to the mixture.

Treatment of cankers

Whatever the origin of cankers, their treatment is essentially the same except that in the case of an infectious disease, such as the brown rot canker, the work must be done with great care in order to insure that all trace of the fungus is eliminated.

Whenever the cankers occur on limbs that can be removed without detriment to the tree, it is best to remove them while pruning; care being taken to cut several inches below any visible injury, as the living fungus in the brown rot canker extends back beyond any external evidence of the disease, and if allowed to remain will continue to infect healthy wood. If the cankers occur on limbs that it is desirable to save, they should be cleaned out by removing all the diseased wood a short distance back of any visible evidence of the disease. The diseased wood and bark can be readily detected by its brown color. In the brown rot cankers it is very important to remove all this discolored tissue, as it is in this tissue that the fungus lives and if it is not removed the disease will spread. The amount of bark that it is necessary to remove depends on the extent of the diseased part. Sometimes the fungus has extended so far beyond the healthy callus that it is necessary to remove it entirely (Plate VII A); while at other times the fungus may have extended but slightly into the upper and lower extremities of the callus and it is necessary only to remove a small part. It is always well to leave as much of the callus as possible, to facilitate healing. All the dead bark and twigs should be removed. It is not necessary to remove any of the solid wood except to smooth the treated part. The wound should be pointed at the upper and lower extremities and the bark should be cut at right angles to the wood (Plate VII, B). As soon as the wound has dried out it should be coated with gas tar⁴ (Plate VII, C). The gas tar acts as a disinfectant and preservative, and no other treatment is necessary. Trials have been made in order to determine this point, and it is now evident that the use of corrosive sublimate or lime-sulfur solution in addition to the gas tar is unnecessary. Numerous brown rot cankers were variously treated in August, 1911. In June, 1914, the small cankers that had been treated were entirely healed (Plate VIII, A), and the larger ones had formed several inches of callus (Plate VIII, B).

Frost cankers treated on June 20, 1911, by Messrs. Blodgett, Wallace, and Reddick in Orleans county, healed very rapidly as may be seen from the accompanying photographs (Plates IV and V), some of which were made three months later. In the case of the tree shown in Fig. B of Plate IV, only a very small amount of healthy bark was left, yet at the end of three months a remarkable roll of new tissue had developed and the tree showed no ill effects whatever so far as could be judged by the appearance of the foliage.

The tools needed for such work are in the possession of every fruit-grower. A good, stout pruning knife, a pruning saw, a gouge, and a mallet comprise the list.

The time required to treat cankers varies greatly with their size and condition. Small cankers readily accessible can be treated quickly with the pruning knife, while crotch cankers involving several limbs may require an hour. A man can average fifty cankers in a day of eight hours. Labor is the largest item of expense, as a gallon of gas tar, costing 20 to 40 cents, will cover approximately 400 cankers.

⁴ This is residue in the manufacture of illuminating gas from coal, and can be obtained at any gas works.